CLAIM

1. A coating method for forming a coating film of ceramic material on a surface of a internal member disposed in a vacuum processing apparatus, the internal member having holes formed on the surface, the method comprising:

a step (A) of filling the holes of the internal member with padding plugs each of which has a core member made from a metal material and a metal-resin composite layer covering the circumferential surface of the core member, the metal-resin composite layer being a complex consisting of a metal material and a resinous material exhibiting nonconjugative property to the coating film;

a step (B) of forming a ceramic coating film on the surface of the internal member by means of plasma spraying after the step (A); and

a step (C) of extracting the padding plugs out of the holes of the internal member after the step (B).

2. A coating method according to claim 1, wherein

the surface of the internal member having holes is composed of a material selected from a group of aluminum and aluminum base alloys;

each of the holes has an inner diameter ranging from 0.3 mm to 5.0 mm;

the core member of the padding plug is formed by a steel wire;

the metal-resin composite layer of the padding plug is composed of an electroless nickel plating layer ranging from 10 to 50 μm in thickness and having fluoropolymer particles dispersed therein;

the coating film is composed of a material selected from a group of Al_2O_3, AlN, TiO_2 and Y_2O_3; and

at the step (A), the padding plugs are fitted in

the holes so as to project from the surface of the internal member by 1 mm to 3 mm.

3. A coating method for forming a first coating film providing an insulating layer and a second coating film providing an electrode layer embedded in the insulating layer on a base part of an electrostatic chuck as a internal member disposed in a vacuum processing apparatus and having gas injection holes formed on the surface thereof, the method comprising:

a step (D) of forming a first insulating layer composed of a coating film of Al_2O_3 on the surface of the base part of the electrostatic chuck by using the coating method as defined in claim 1;

a step (E) including:

a series of:

a process (a) of filling the gas injection holes of the base part with padding plugs made of a metal material;

a process (b) of forming a tungsten coating film on the surface of the first insulating layer by means of plasma spraying after the process (a); and

a process (c) of extracting the padding plugs out of the gas injection holes of the base part of the electrostatic chuck after the process (b); and

forming the electrode layer arranged on the first insulating layer; and

a step (F) of forming a second insulating layer composed of a coating film of Al_2O_3 on the surface of the electrode layer by using the coating method as defined in claim 1.

4. A coating method according to claim 3, wherein

the surface of the internal member having holes is composed of a material selected from a group of aluminum and aluminum base alloys;

each of the holes has an inner diameter ranging from 0.3 mm to 5.0 mm;

the core member of the padding plug is formed by a steel wire;

the metal-resin composite layer of the padding plug is composed of an electroless nickel plating layer ranging from 10 to 50 μm in thickness and having fluoropolymer particles dispersed therein;

the coating film is composed of a material selected from a group of Al_2O_3, AlN, TiO_2 and Y_2O_3; and

at the step (A), the padding plugs are fitted in the holes so as to project from the surface of the internal member by 1 mm to 3 mm.

5. A internal member having holes manufactured by using the coating method as defined in claim 1.

6. A internal member having holes according to claim 5, wherein

the surface of the internal member having holes is composed of a material selected from a group of aluminum and aluminum base alloys;

each of the holes has an inner diameter ranging from 0.3 mm to 5.0 mm;

the core member of the padding plug is formed by a steel wire;

the metal-resin composite layer of the padding plug is composed of an electroless nickel plating layer ranging from 10 to 50 μm in thickness and having fluoropolymer particles dispersed therein;

the coating film is composed of a material selected from a group of Al_2O_3, AlN, TiO_2 and Y_2O_3; and

at the step (A), the padding plugs are fitted in the holes so as to project from the surface of the internal member by 1 mm to 3 mm.

7. An electrostatic chuck manufactured by using the coating method as defined in claim 3.

8. An electrostatic chuck according to claim 7, wherein

the surface of the internal member having holes is composed of a material selected from a group of aluminum and aluminum base alloys;

each of the holes has an inner diameter ranging from 0.3 mm to 5.0 mm;

the core member of the padding plug is formed by a steel wire;

the metal-resin composite layer of the padding plug is composed of an electroless nickel plating layer ranging from 10 to 50 μm in thickness and having fluoropolymer particles dispersed therein;

the coating film is composed of a material selected from a group of Al_2O_3, AlN, TiO_2 and Y_2O_3; and

at the step (A), the padding plugs are fitted in the holes so as to project from the surface of the internal member by 1 mm to 3mm.